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VIII.—*Some Notes on the Habits and Distribution of Paradoxornis heudei David.* By Capt. HUBERT LYNES, R.N., M.B.O.U.

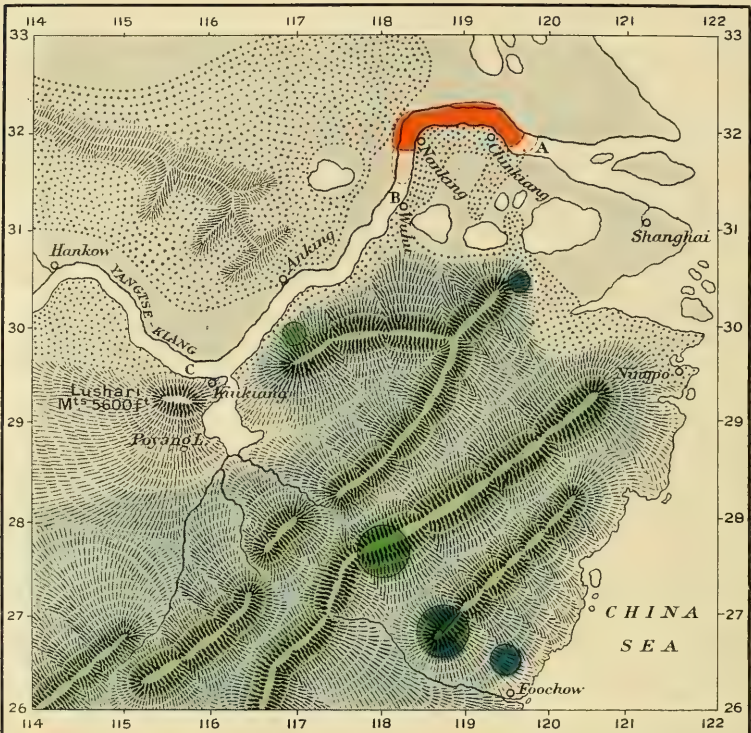
(Plates VII.—IX.)

PARADOXORNIS HEUDEI, one of the most northerly-ranging of the Oriental group of birds known as "Crow-Tits," was first made known to science in 1872 by Père David * from specimens obtained by Père Heude near Nanking, on the lower Yangtze Kiang. The species has since been made better known by several ornithologists—*e. g.*, Styan (near Nanking, *vide* 'Ibis,' 1891, p. 336), La Touche (near Chinkiang, *vide* 'Ibis,' 1906, p. 438), and others—from the same localities.

All the foregoing information relates to *winter* observations and specimens only; the breeding-habits and range of the species were unknown, and no material for the precise determination of its systematic position appears to have been available, except a few skins obtained in the winter time.

Whilst in command of H.M.S. 'Cadmus,' 1910–12, engaged chiefly on duties in the waters of the lower Yangtze, I was able to make myself more or less familiar with the bird's habits, and to discover its breeding-haunts, proving the species to be strictly sedentary; I was also able to send

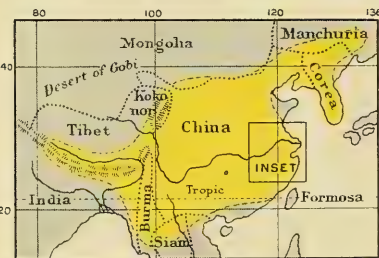
* Comptes Rendus, lxxiv. p. 1449.



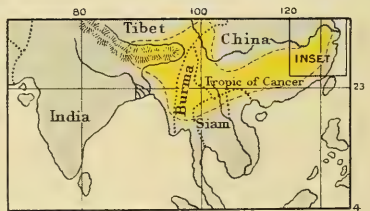
DISTRIBUTION OF GENUS "PARADOXORNIS"—CENT. S.E. CHINA.

- *P. heudei* (Lower Yangtze only).
- *P. gularis*. Gray.
- *P. guttaticollis*. David.
- Mountainous country with altitudes above 3,000 ft. (Max. about 6,000 ft.).
- Hilly " " " " 1,000 ft. and below 3,000 ft.
- Low hill " " " " up to 1,000 ft. (mostly 100-300 ft. only).
- Plain tint—Flat, alluvial country.

NOTE. The Yangtze River (only) is shown disproportionately broad to illustrate the distribution of *P. heudei*. Although there are reed beds all the way from A to C (not elsewhere), those between B and C are comparatively scanty ones, and it seems improbable that *P. heudei* will ever be found to extend much above B.



Distribution in the World of "PARADOXORNITHINÆ"
(Sharp's Sub-Fam. H. L. Birds omitting Gen. Panurus).



Distribution in the World of the above
3 species of Genus "Paradoxornis."

- viz. { *P. heudei*. David.
P. gularis. Gray.
P. guttaticollis. David.

Mr. Pycraft some spirit specimens, which are still engaging his attention.

Unfortunately, except for two days in June (when a nest with five eggs and one of the parents were obtained) and half a day in July, the 'Cadmus' was always employed elsewhere during summer and autumn, so that no information could be obtained as to the nestlings or autumn moult; nevertheless, with Mr. Pycraft's results, which will appear in due course, there will be sufficient material to enable one to make a more comprehensive survey of the "Crow-Tit" type and of the life-history of *P. heudei* than has hitherto been possible, and the accompanying remarks are made towards that end.

From what is now known, it is evident that *P. heudei* is one of those sedentary species, similar examples of which are found in many parts of the world, whose range is restricted by that of a certain special environment, presumably always connected directly or indirectly with the maintenance and reproduction of the species.

In this case the special environment is found in the reed-beds of the lower Yangtze. These consist of great areas, both islands and tracts of alluvium lying along the river-banks, covered with a dense growth of giant reeds rising from ten to twenty feet high, and forming a region very distinct from any of the surrounding types of country. It has its own special character of bird-life winter and summer, though the majority of its species are non-residents.

At a rough estimate the reed-beds cover a total area of about 200 square miles*, 75 per cent. of which (including one cluster of islands of 30 and two of 15 square miles of solid reed-growth) lies in the seventy-mile stretch of river that includes the treaty-ports of Nanking and Chinkingang; this constitutes the only *known* home of *P. heudei*.

The remaining 25 per cent. of reed-area is much more spread out, and is not known to be inhabited by *P. heudei*, though it may perhaps turn out to be so, but outside the reed-bed zone the species has never been observed, and almost certainly does not occur. The distribution of the

* *I. e.*, an area equal to that of the Isle of Wight.

species and its allied forms is graphically shown on the map (Plate VII.).

The mode of life of *P. heudei* is so dependent upon the growth of the reeds, that the bird's habits cannot be properly appreciated without some knowledge of the annual changes that occur in the reed-beds; the reader is therefore asked in the accompanying table to follow birds and reeds together "round the year":—

Time of Year.	Reed-beds.	<i>Paradoxornis heudei</i> .
Jan. and Feb.	<p>River at its lowest, the reed-beds are high and dry.</p> <p>The seeds being dropped, the Chinaman spreads himself over the land with reaping instruments; the reeds are harvested for fuel and thatching purposes, and either stacked or floated away down the river in junks.</p> <p>By the end of January most of the reeds have been cut, leaving bare yellow-brown expanses of soil with only the pointed stubs sticking up a few inches to indicate the disappearance of the "reed-forests."</p>	<p>At this season <i>P. h.</i> comes most of all under the notice of the "foreign devil" who goes to shoot the Pheasants that abound in the reed-beds in winter time.</p> <p>More especially is this the case when the harvest is nearing completion and the standing reeds are reduced in area to a number of comparatively small "islands," in which both Pheasant and <i>Paradoxornis</i> are to be found packed. Thus, in a one-acre patch, fifty Pheasants may be beaten out and as many <i>P. h.</i> seen, besides numerous Suthoras, Buntings, Piptits, and other small birds.*</p>
March and April.	<p>The river commences to rise.</p> <p>Early in March the young reeds appear above the soil; they grow at an astonishing rate, and by the end of April form dense coverts of green exuberant plant-life from 3 to 6 feet high, their bases accompanied by a thick growth of convolvulus and other clinging plants.</p> <p>At this season insects do not appear to have commenced their attacks on the reeds.</p>	<p>This is the lean time of year for <i>P. h.</i>, for the growing reeds have not yet begun to be used as nurseries for the numerous insects that form their staple diet. The birds therefore have to pick up a precarious existence from other sources, maybe from the few last year's reeds not thought worth cutting by reason of their standing in water at reaping-time, or from stacks and thatches, for which latter purpose the birds will come right into the farms on the raised ground bordering the reed-beds. This, presumably, is the season at which the birds have been observed by David and La Touche out of the reed-beds.</p>

* *Suthora webbiana*, *Emberiza pallasi*, *E. spodocephala*, *Anthus blakistoni*, &c

Time of Year.	Reed-beds.	<i>Paradoxornis heudei.</i>
May, June, July.	<p>The river continues to rise in consequence of the melting of the snow in the mountains of Tibet and western China; in normal years June sees the reed-beds beginning to flood and July the maximum height of the river for the year, when the reeds are all standing in not less than a foot of water; but should the rainfall in the lower basin be abnormally heavy, four feet or even more.</p> <p>The reeds reach their full development about July, and are then from 10 to 20 feet high.</p> <p>During this period many insects, such as earwigs, spiders, &c., attack various parts of the reeds, to make homes for their offspring.</p>	<p><i>P. h.</i> returns to its home among the reeds, which once more furnish insect-food in abundance.</p> <p>Nests are built, woven around the reed-stems, in Reed-Warbler fashion, some distance above their bases, and egg-laying commences in June.</p>
August, Sept., October.	<p>The river falls slowly, but in normal years not enough to uncover the main "beds."</p> <p>The seeds ripen.</p> <p>The summer bird-visitors, such as Reed-Warblers, Ardeidæ, &c., depart, and the winter-visitors commence to arrive.</p>	<p>A time of peace and plenty for <i>P. h.</i>, the supply of insect-food is at its greatest abundance, and its haunts are undisturbed by man.</p> <p>Presumably an autumn "complete" moult is undergone at this season.</p>
Nov., Dec.	<p>The river falls faster, and during November (in normal years) the reed-beds once more become high and dry.</p> <p>Many winter bird-visitors from the north, Buntings predominating, besides Pheasants from the neighbouring lands, congregate in the now dry reed-beds and subsist on the various seeds and fruits of the reeds water-plants, and undergrowth.</p>	<p>Whatever autumnal moult may have been carried out is finished by November.</p>

Food.

The result of much observation in the field and the examination of some twenty gizzard-contents prove that in the months of November, December, January, February, April, and June, the food is entirely insects and their larvæ, and it is highly probable that the same holds good all the



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year round*; the lack of gizzard-muscle is opposed to the digestion of hard things. The food easiest obtained and which appears in all stomachs examined, frequently to the exclusion of all else, is a curious insect shaped like a flat capsule with a transparent tough coat, resembling a miniature oval pancake about $\frac{1}{4}$ " \times $\frac{1}{5}$ ". These are found in most of the reeds, lying in clusters near the nodes, plastered on the hard stem of the reed and covered by the sheath, which only requires to be stripped off to disclose the capsules—an operation that presents no difficulty to the beak even of so small a bird as the Penduline Tit (*Aegithalos consobrina*). But the massive bill of *Paradoxornis* is designed for heavier work, and is, in fact, used for tearing open the hard reed-stems themselves, to obtain access to their pithy centres—no light job with reeds of such gigantic stature.

The *modus operandi* is first to discover the tiny circular hole by which the insect originally gained access to the interior of the reed, then, having inserted the point of the upper mandible in the hole and grasped the reed with wide-straddled feet, it wrenches and twists, swinging with the whole weight of the body until sufficient strips have been torn away to open up the insect-larder inside. (See Plate VIII.)

The rustling, crunching, and tearing noises made by a party of birds so engaged may frequently be heard before catching sight of them; and so the flock works steadily through the reed-forest, flitting from one reed to another, generally alighting near the base and climbing upwards—a ceaseless round of examination, tearing, wrenching, and assimilation, so absorbing that there seems time for little else.

Generally, as one advances in dry reed-jungle, where every step produces elephant-crashing noises, the bird-population, warned, flits on ahead, and is difficult of approach. Not so *P. heudei*, he is much too busy and unconcerned to give the intruder more than an inquisitive

* This is at variance with Styan, 'Ibis,' 1891, p. 386.

stare ; even if one of his mates is shot alongside him, he will probably merely suspend his absorbing search after food (as if in pained surprise at the noise) for a few moments only.

When disturbed at the nest, however, as might be expected, more concern is shown, the owners will then flutter about the reeds with expanding wings and tail, "swearing" in an undertone.

The call-note is a musical trill, which may be likened to a softly blown pea-whistle and reminds one somewhat of the spring call of our Nuthatch. It is for these trills that it is necessary to listen, in order to locate the birds both winter and summer. Repeated strophes of the trill probably do service as a song, but there is no real one.

In alarm, as when roused from the nest, there may be an undertone of Crow-like "swearing" or a guttural "chup-chup" in conjunction with the trill.

Nidification.

Nest-building appears to commence in June ; the one nest, obtained on the 11th of June, with five fresh eggs, may have been an early one, for another, only just begun (at which the male bird was shot), was found on the following day.

The completed nest is a beautiful structure (Plate IX.), woven entirely out of strips torn off dead reeds by the birds themselves ; just one or two pieces of cobweb appear in the binding.

It is cup-shaped, supported in mid-air by two reeds (in Reed-Warbler fashion) at a height of five and a half feet above the ground. Its main body is of strips of the sheath part of the reed, about one-tenth of an inch broad ; the lining, rim, and binding strands are mostly mere filaments of the tough reed-stems themselves.

The dimensions are as follows :—Inside : width 2 inches, depth $2\frac{1}{4}$; outside : width about $3\frac{1}{4}$ inches, depth about $3\frac{3}{4}$.

The eggs are oval in shape, of smooth texture, and medium gloss ; the ground-colour is white, tinged with greenish. The markings consist of large blotches and clouds of pale sienna



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PARADOXORNIS HEUDEI.

with centres of darker sienna and of burnt-umber; here and there are underlying blotches and spots of pale inky purple. Two of the five eggs have the markings disposed mainly in a wreath round the large end; the blotches being sharper-edged and their colour purer than in the other three.

The eggs have a distinct family resemblance to those of some of the other *Paradoxornithinæ* in the British Museum, but not to those of the genus *Suthora*, which are uniform in colour.

Measurements:—Length, max. 18·8 mm., min. 18, average 18·3. Breadth, max. 14·5 mm., min. 14·2, average 14·4.

Remarks.

The discovery of its nest and eggs serves, in its degree, to strengthen the generic relationship of *P. heudei* with *P. gularis*, *P. ruficeps*, and *P. guttaticollis*; but the difficult question of the relationship of the *Paradoxornis* group with the genera *Suthora*, *Conostoma*, *Cholornis*, and especially with *Panurus*, the most debateable, interesting, and (fortunately) accessible of all, must await Mr. Pycraft's investigations on the spirit-specimens. I would remark, however, that, in so far as the characters of nests and eggs affect the question, *Suthora*, with its whole-coloured eggs, does not appear to be so closely related as perhaps the birds' external characters seem to show.

From the distribution chart, it will be seen that, besides being infinitely more restricted than that of its presumably nearest allies, the range of *P. heudei* is situated at the extreme north-eastern limit of the range of its genus, whose centre of distribution is eminently a sub-tropical one. It is therefore more reasonable to attribute the origin of this species to the extension of an ancestral form from a more remotely established subtropical centre of distribution, than to consider the species as a relic of a once more northerly-ranging group.

I am convinced that only by the very gradual process of natural adaptation could the species continue to exist and

reproduce away from its chosen reed-beds, where an isolation as complete as that of any insular form readily accounts for the absence of intermediate links between itself and its nearest allies.

From the foregoing it will be observed that the following conditions appear to be necessary to the continued existence of the species :—

- (a) The existence of the reeds themselves.
- (b) A sufficiency of food in the vicinity during March and April, when practically all the reeds have been harvested
- (c) An elevated position of nest.
- (d) Continued immunity from persecution.

Concerning *a*, *b*, and *c*, there is little to be said that has not already been explained in the foregoing pages: *a* is certainly a somewhat arbitrary statement; nevertheless, for the reasons given, and for others beyond the scope of this paper, which only personal acquaintance with the birds and the local conditions can give, I think it is justifiable.

With regard to *d*, there is more to be said. Natural enemies are probably not a serious consideration. During the period of reproduction, the birds are safeguarded against terrestrial enemies by the annual flooding of the reed-beds, and although the reeds swarm with mice, who rear their offspring in elevated ball-nests during the summer-time, it is unlikely that any abnormal plague of larger rodents, which might arise either from natural causes or at the hand of mankind, could survive the summer floods.

In summer there are few winged enemies, and in winter, although Sparrow-Hawks, Buzzards, and Harriers abound, it is evident that they do not take undue toll of *Paradoxornis*, nor is there reason to foresee an abnormal increase of birds-of-prey in the district.

The vital point is that the species should continue to be of no importance to mankind; for, with the bird's indifference to his presence, decimation could very easily be accomplished towards the end of the reed-cutting in January and

February, with consequent extermination in a very few years' time. Fortunately, however, there is nothing at present to suggest the likelihood of such a calamity. Their insect diet perhaps makes the birds difficult to keep in captivity, for the species does not appear in the cages of that inveterate "bird-fancier," John Chinaman; they have no ornamental plumes, stores of oil, or other such possessions likely to attract the attention of the utilitarian, so that, despite their isolation, singularity of habitat, and indifference to man, I think we may say with a satisfactory measure of confidence, "Floreat *Paradoxornis heudei*."

IX.—*Notes on Birds observed in the Bermuda Islands during the Winter of 1912-1913.* By JOHN NOBLE KENNEDY, R.N.

THE Bermudas are a curiously elongated group of islands situated in the Atlantic about 600 miles west of Cape Hatteras in the United States, and in latitude 32° 15' N. and longitude 64° 51' W. There are no high hills and most of the ground is cultivated, the fertile meadows being interspersed by cedar groves. The climate during the winter months is warm and damp.

The group does not appear to be in one of the direct lines of migration, but the list of "accidental visitors" is a long one. I once visited the lighthouse at Gibb's Hill with a view of gaining some information as to migrants killed at the lantern, but I was told that only one bird had been taken in this manner during the past three years.

The last general list of the birds of these islands, compiled by Captain S. G. Reid, R.E., appeared in the 'Zoologist' for October and November 1877, and, except for an article on the resident land birds published in 1901*, the ornithology of the Bermudas appears to have been somewhat neglected of late years.

* "The Resident Land Birds of Bermuda," by Outram Bangs & T. S. Bradley, 'Auk,' vol. xviii. pp. 249-257.